Rocky Mountains | Southwest | Great Plains

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A Portable Rocket-Net System for Capturing Wildlife

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Construction, use, and safety of a portable rocket-net system for use in wildlife capture are described, including the standard 3-rocket system, an experimental 2-rocket system, and a remote-controlled firing unit. Results of extensive system testing, as well as comments on field application to capture wintering bald eagles in northern Arizona, are presented.

Keywords: Rocket net, wildlife capture, trapping, bald eagle, *Haliaeetus leucocephalus*, Arizona

Management Implications

The portable rocket-net capture system described in this note was developed and refined from earlier, unpublished designs of the Pennsylvania Game Commission and New York Department of Environmental Conservation. It was successfully used to capture bald eagles (*Haliaeetus leucocephalus*) in northern Arizona as part of a winter habitat study (Grubb and Kennedy 1982) during 1983, 1984, and 1986.[2] Documentation of the construction, testing, and field application of this technique is intended to facilitate use and further development elsewhere. The rocket-net technique, with the current refinements, will be useful in capturing a wide variety of wildlife under conditions requiring flexibility and portability in the trapping effort.

Introduction

The original cannon-projected net trap developed by Dill and Thornsberry (1950) to capture Canada geese (*Branta canadensis*) and mallards (*Anas platyrhynchos*) at permanent, lakeshore trap-sites has been modified and utilized to capture a number of mammalian and avian species (Turner 1956, Marquardt 1960, Lacher and Lacher 1964). Hawkins et al. (1968) replaced cannon projectiles with quick-burning, high-thrust, recoilless rockets to capture white-tailed deer (*Odocoileus virginianus*) and fallow deer (*Dama dama*). Arnold and Coon (1972) used recoilless rockets to capture brown-headed cowbirds (*Molothrus ater*). These rocket systems had the advantages of being lighter, more versatile, and easier to set up than earlier cannon-net systems and, as such, were often used for temporary trap sites.

In 1973, the Pennsylvania Game Commission developed a portable, self-contained, rocket-net system to trap wild turkeys (*Meleagris gallopavo*) and Canada geese. This system used a plywood box to house the net and rocket launchers and newly designed flip-flop rockets. These rockets were made to flip over in flight by attaching the net to the leading end, thus causing the last of the power burst to direct the rockets and attached net downward, expediting deployment.[3] In 1982, the New York State Department of Environmental Conservation added a remote-controlled firing unit and adapted this rocket-net box system to capturing bald eagles.[4] A similar remote firing unit has also been used for wildlife capture with a cannon net in Colorado (Grieb and Sheldon 1956).

This note describes the construction, use, and safety of the rocket-net capture system; an experimental, smaller 2–rocket system; and a remote-control firing unit. The results of extensive system testing, as well as comments on field application of this technique for trapping of wintering bald eagles, are also presented.

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[2]*Grubb, T. G., S. J. Nagiller, W. L. Eakle, and G. A. Goodwin. In preparation. Winter roosting patterns of bald eagles in northcentral Arizona.*

[3]*Personal communication with G. A. Wunz, Pennsylvania Game Commission, 1982.*

[4]*Personal communication with P. E. Nye, New York Department of Environmental Conservation, 1982.*

Materials and Construction

Appendix 1 lists materials needed to construct the rocket-net box system. Nets, recoilless rockets, and propellant were purchased from Wildlife Materials Inc. (WMI), Carbondale, IL.[5] The portable net box requires about 10 hours to construct; the drag weights, 2 hours; and the remote-control firing unit, 12 hours. In 1983, the net and rockets cost about $450; materials for the box and drags, $120; and construction of the remote unit, $125. Propellant cost for each 3–rocket firing was about $7.

Nets

Two 5.1-cm-mesh turkey nets of 27-kg-test, knotless nylon, treated with a dark protective coating were used in this study: a large (14.1 by 9.9 m) 3–rocket net for open country situations and multiple captures (fig. 1); and a small (7.5 by 7.5 m), specially ordered, 2–rocket net for confined trapping situations and single captures. Rocket shrouds (3–rope pulling yokes at each corner and in the center of the leading edge) were shortened and refitted to provide more even distribution of rocket power to the net (fig. 1b) and also to reduce the inherent kinking and fouling of these braided nylon lines. Two extra attachment eyes were cut off the trailing edge, leaving the corner and center eyes for attaching drags. Draglines were attached directly to the center eye, and to loops tied at the ends of 1–m nylon lines extending from each of the rear corners. All loose ends at knots and eyes were trimmed and taped to eliminate as many potential sources of snagging as possible. Similar adjustments were made on the small net, which used only 2 rockets and drags attached at the corners.

Folding of the nets is described in Appendix 2 (G). Successful, consistent net deployment was directly proportional to the care taken in cleaning the net of all debris (dried grass, twigs, bark, etc.), and in folding it neatly into the box, with drag and shroud lines properly positioned. The nets did not extend to their full dimensions when shot from the rocket-net box, but these procedures helped maximize performance.

Rockets

Rockets for the large net were weight-forward recoilless net-trap rockets modified to flip-flop configuration by WMI (i.e., stabilizer bar and chain removed and front attachment provided (fig. 2a)). These manufactured rockets were 5.1 cm in diameter, 26 cm long, and weighed 3.6 kg. Rockets for the small net (22 cm long, also weighing 3.6 kg (fig. 2a)) were made with similar 5.1–cm seamless galvanized pipe, capped at both ends and drilled for the escape jets and attachment eyes. The small rockets were simply laid in the channels of the rocket launchers. On the larger rockets, a notch was filed in one weld of the attachment ring to catch on the leading edge of the rocket launcher. This notch kept the larger rocket in a better firing position, forward on the rocket launcher. Keeping cap threads well lubricated and not tightening caps past initial seating minimized "freeze-up" after firing and impact.

[5] *The use of trade and company names is for the benefit of the reader; such use does not constitute an official endorsement or approval of any service or product by the U.S. Department of Agriculture to the exclusion of others that may be suitable.*

Propellant

The propellant consisted of M–6 240–mm howitzer nitrocellulose propellant in 2.5– by 1.0–cm cylindrical pieces, primed with a starter packet of black powder and small 75–mm howitzer pellets, and initiated with an electric squib. Components came packaged in small, heavy-duty plastic bags; and, as assembled, the charges were classified as Class B, Special Fireworks by the U.S. Department of Transportation. A Cooperative Agreement between the prospective user and a Regional Office of the U.S. Fish & Wildlife Service (FWS) is required before charges can be purchased and shipped from a commercial vendor. The FWS purchases rocket propellant from the Department of the Army and stores it on Crab Orchard National Wildlife Refuge, Carterville, IL. In addition, a Basic Ordering Agreement is also required between the commercial vendor and the FWS. (At the time of this writing, the Agreement between WMI and FWS has expired and the process of establishing a new commercial vendor is underway.)

Rocket-Net Box

The rocket-net box (fig. 3) was made of 2.0-cm marine- or external-grade plywood. Twenty-four gauge sheet metal protected the top wood surface from the rocket blast. All metal edges were covered with duct tape to protect the net as well as handlers from the relatively sharp edges. Angle-iron rocket launchers, bolted to the box at the rear with carriage bolts (smooth head inside), were raised and seated in a notched 2 by 4 placed parallel to the leading edge of the box. The height and spread pattern of the rockets were adjusted by positioning the rocket launchers on this front support. A 2 by 2 under the leading edge of the box provided a slight up-angle for more efficient net deployment, and another point of adjustment for fine tuning deployment. Carrying handles that folded flat against the box when it was rigged for firing were attached on the sides.

Drag Weights

Drag weights (fig. 2b), made from 5.1-cm PVC piping, were designed ("T" shape) to prevent rolling when jerked forward by the fired net, and to permit varying the amount of weight (screw-in cap on the trailing end). Approximately 6 kg of lead shot was used in drag-weight tests and field application on snow and grassy surfaces. Most of the outer nylon draglines were replaced with 5 m

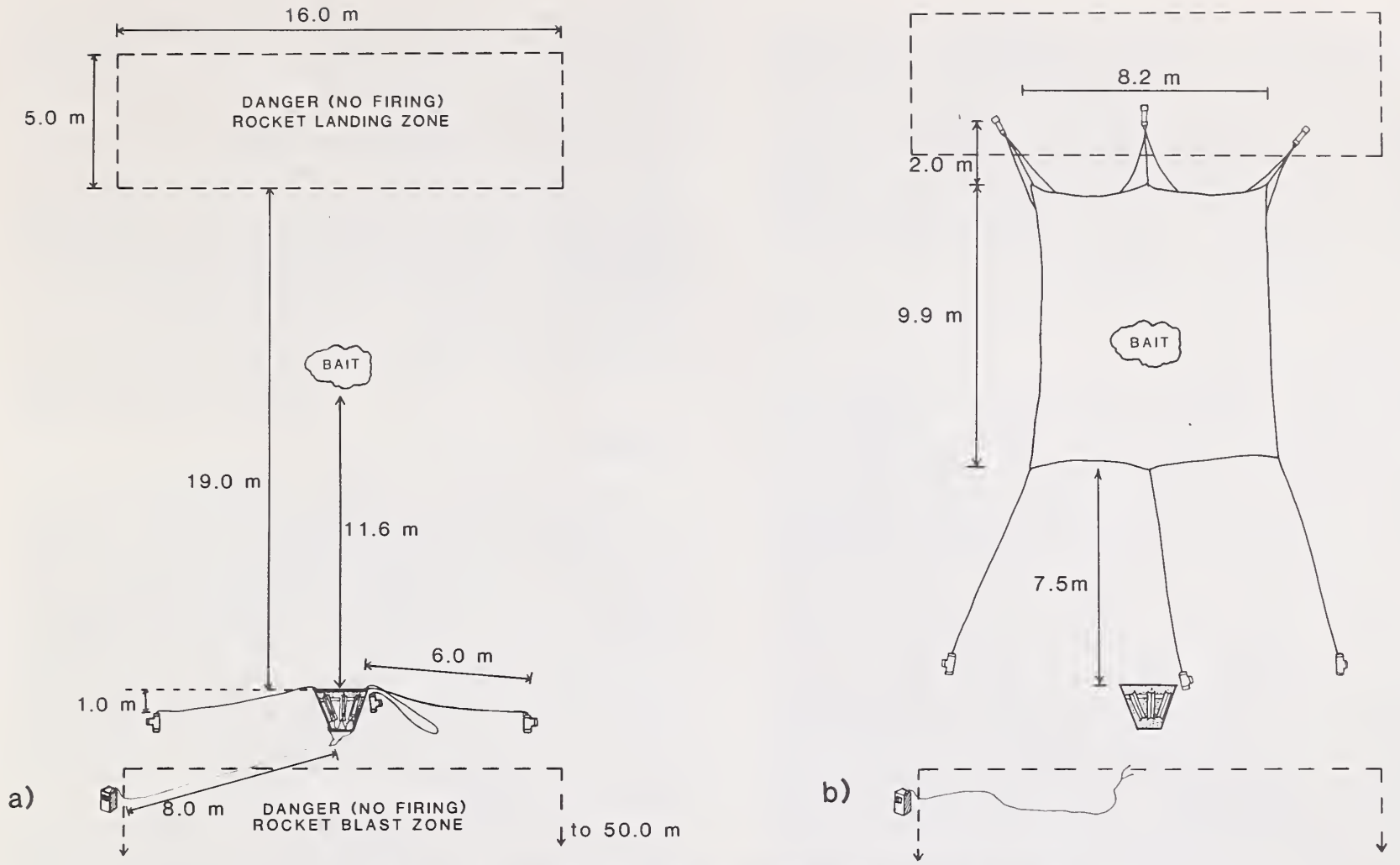

Figure 1.—Portable rocket-net set, from above, before (a) and after (b) net deployment. Note no-firing zone, bait placement, and drag/dragline locations.

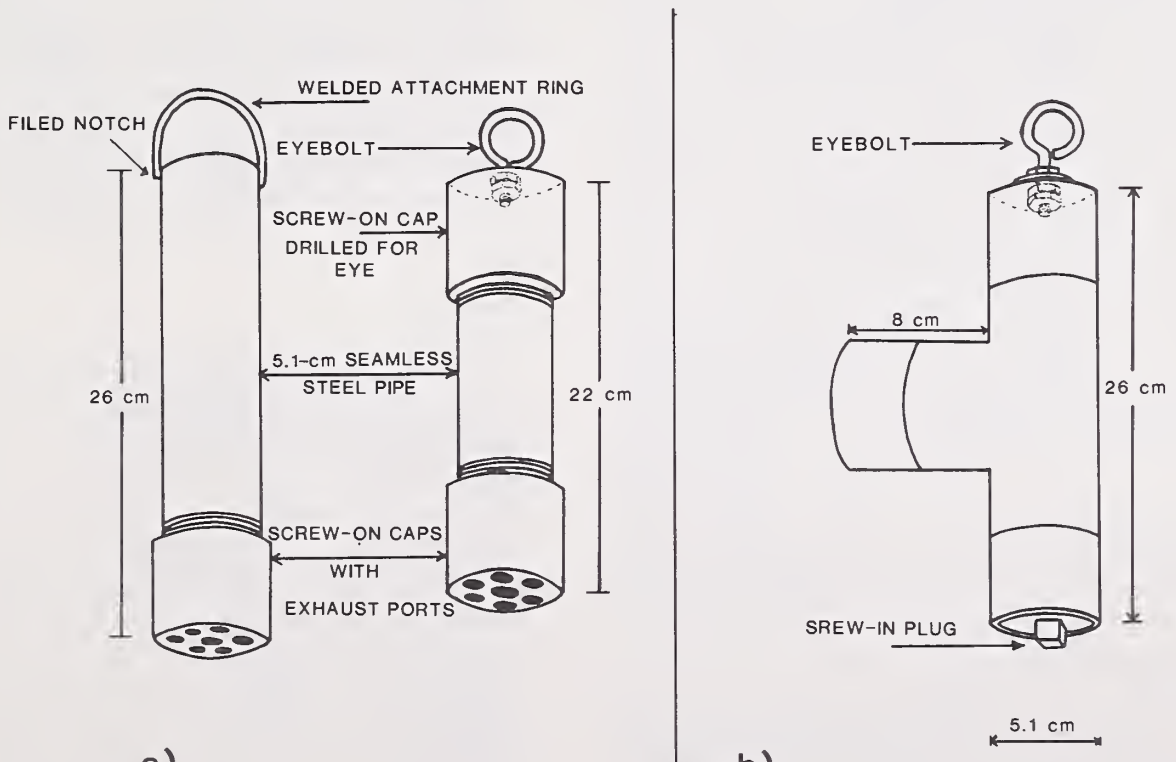

Figure 2.—(a) WMI recoilless flip-flop rocket on left and "home-made" rocket used with small 2-rocket net on right. (b) Roll-resistant, variable-weight drag for the portable rocket-net system.

of 10-mm-diameter shock cord, attached 1 m from the net, to reduce the shock of and permit fuller deployment. The 7-m nylon line for the middle drag was retained and used without shock cord. Color-coding the rocket leads and the draglines (green right, blue middle, red left) with colored tape greatly facilitated set-up and folding procedures. Drags and draglines had to be laid out clear of the box handles and any rocks or ground obstructions that could foul smooth deployment.

Remote Firing Unit

The remote-controlled firing unit (fig. 4) was built using a battery-powered Cox radio guidance system, designed for hobbyists. A weatherproof box housed a 6- or 12-volt lantern battery, the signal receiving and servo units, and a switch to close the firing circuit. A trim adjustment on the remote control was used to adjust the sensitivity of this switch in the firing unit (i.e., the distance it travels before making contact). For safety, an external arming switch was added into the circuit to help prevent inadvertent misfires. The ports for lead-wire hookup to the rockets were also external. The servo had its own 4–cell AA battery pack; but, because of its limited life span in cold conditions, the wiring was modified for the servo to draw power from a 6–volt lantern battery, which was sufficient for initiating the rocket-net system.

The firing unit was tested before every shot with a 6- or 12-volt (depending on lantern battery voltage), minilamp with leg wires that could be inserted into the external lead-wire ports. This test lamp remained in place, as an extra warning of any inadvertent closing of the internal switch, until it was replaced with the firing line just before final arming. The firing line, made of ordinary 16-gauge lamp cord, was used to connect the squib lead wires to the firing unit; the 8-m length permitted an operator to arm the system at a safe standoff distance (fig. 1a). Alligator clips on the firing line facilitated attachment to the sqib lead wires.

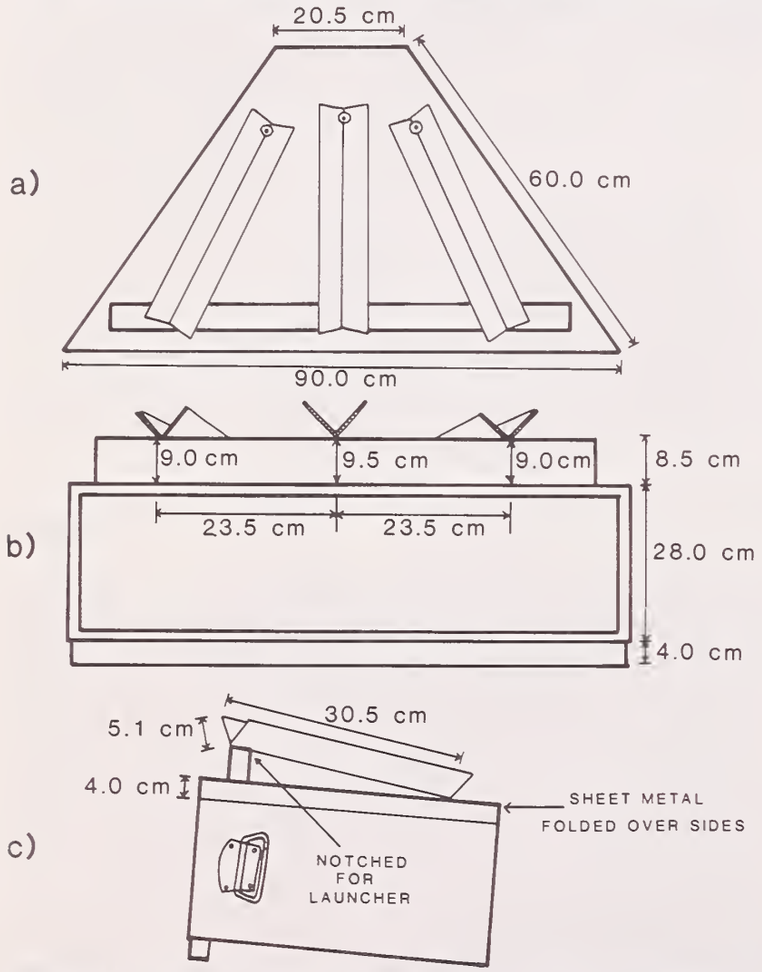

Figure 3.—Rocket-net box, (a) top, (b) front, and (c) side views.

System Testing

Methods

I experimented with charges, rocket launcher elevation and angle, rocket positioning, box elevation, weights and locations of drags, dragline positioning, net folding, and overall net deployment. In addition, I tried to determine the amount of propellant required for consistent and optimal net deployment for both systems through controlled variation of pellet numbers in each rocket charge. Because prepackaged charges varied from 33 to 38 pellets and gave inconsistent firing results, the number of M–6 pellets in every charge was counted and labeled before use.

During familiarization, testing, and development, the relative height, speed, and degree of smoothness during deployment of the net were noted. After each test shot, I recorded centering and fullness of the deployed net and also drag position (direction, distance, and manner in which pulled from original location), which was a good indicator of proper rocket firing and net deployment. Also measured were a) distance from the rocket-net box to the rear edge of the net, b) distance from the box to the center of the net, c) net depth (front to rear distance), and d) net length (side to side distance). The results of these observations formed the basis for the construction and procedural guidelines described.

Results

The rocket-net systems were test fired 61 times (large net 33, small net 28). Charge patterns of 30–30–30, 32–32–32, 30–32–30, 32–30–32, 34–34–34, and 34–30–34 were tried with the 3–rocket net and patterns of 30–30, 28–28, 27–27, and 26–26 with the 2–rocket net. Based on the above criteria, patterns of 34–30–34 and 26–26 provided the best deployment. These patterns yielded average measurements of 7.5 m box to rear edge, 12.6 m box to center, 9.9 m depth, and 8.2 m width for the large net (n = 14, fig. 1b); and 8.2, 11.0, 6.0, and 5.1 m, respectively, for the small net (n = 16). Maximum coverage for both nets was about 60% of their fully stretched potential. Rockets landed 19.8–23.1 m (large net) and 15.0–18.3 m (small net) from the box. Both nets deployed in about 1 sec, with an estimated trajectory zenith of approximately 2 m. Good shots with the large net resulted in the center drag not moving, and the outer drags moving less

than 1 m. The small net tended to pull its drags forward 3–4 m.

Firing Procedure

Appendix 2 provides a procedural checklist for operating the rocket-net capture system. Major steps (after the net has been folded into the box) include testing the firing unit, locating and aligning the rocket-net box, placing the drags and draglines, loading the rockets, completing the firing circuit, and arming the firing unit. Additional procedural information can be found in Dill (1969) and Bloom (1987).

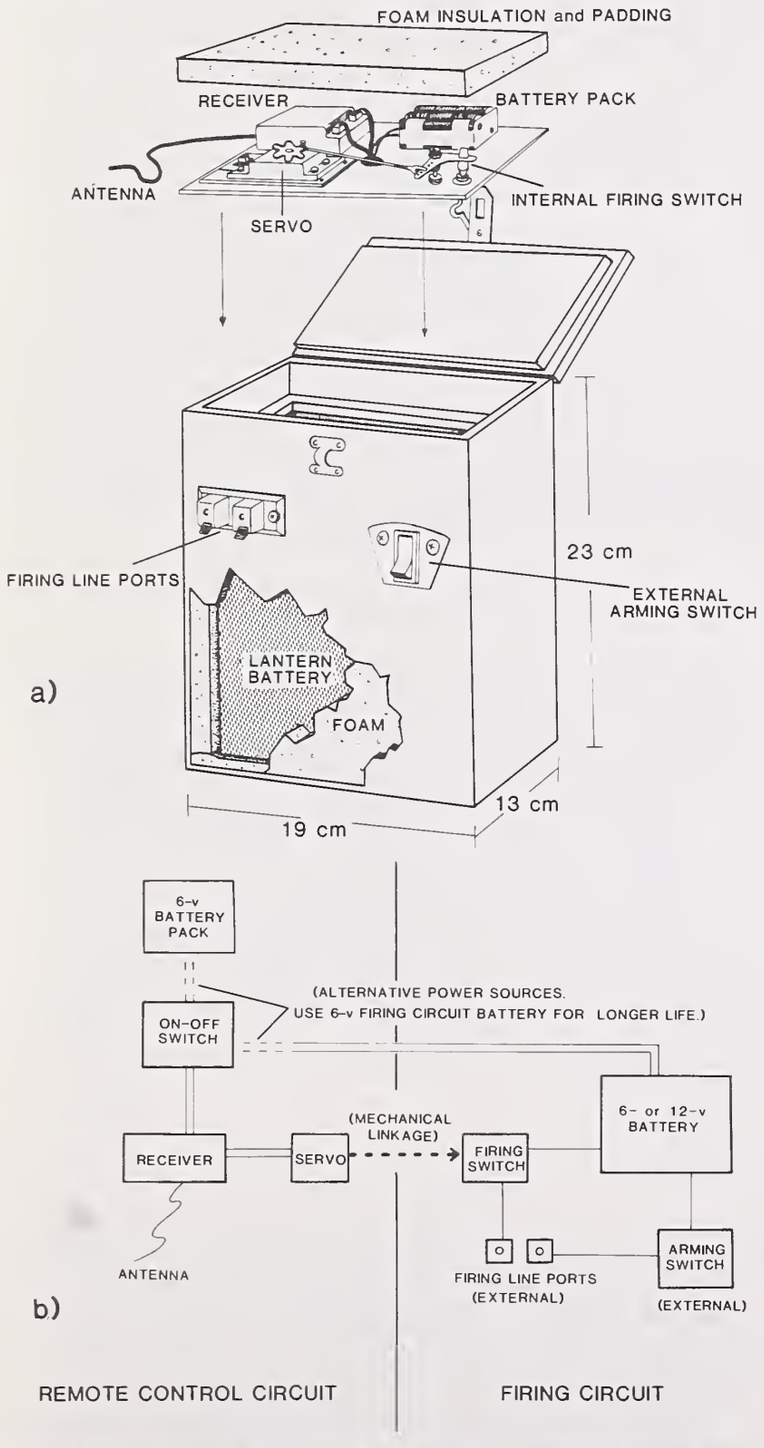

Figure 4.—(a) Remote firing unit for portable rocket-net system, with (b) wiring schematic for component placement.

The firing line permits workers to be well clear with backs turned when the system is activated. In addition, hard hats, earplugs, and goggles are recommended during set preparation and arming, as a precaution against the loud noise and potential flying ground litter from the rear of the rocket box. Vehicles and other equipment should also be kept more than 50 m away from the rear of the box during testing. As much as possible, workers should stay to one side when preparing the rockets. They should avoid standing directly behind, and NEVER move in front of, loaded rockets. One person should be responsible for testing the circuits, connecting the firing unit, and initiating the system. That person should keep the remote-control unit with him at all times. A blasting galvanometer is recommended to test circuitry because conventional ohmmeters or multimeters may produce enough current to detonate the rockets when tested. Dill (1969) presents a detailed list of other safety precautions applicable to both cannon and rocket netting.

Winter Bald Eagle Trapping

For trapping wintering bald eagles, bait stations were established near known concentration areas, along lakeshores and in open pinyon-juniper (*Pinus* spp.-*Juniperus* spp.) rangeland, in north-central Arizona (Grubb and Kennedy 1982). Livestock, large ungulate, and waterfowl carrion (typical winter food of bald eagles in northern Arizona) was set out at least a week before actual trapping began. A decoy rocket-net box, constructed of lightweight (0.6–cm) plywood, with fishnet hung in the opening and cans painted black for rockets, was placed near each carrion station to acclimate the eagles to the presence of the box. Once eagles began to use a station, the decoy was replaced with a functional system the night before anticipated trapping. Both the decoy and real boxes were painted either white or with camouflage patterns, depending upon the prevailing substrate conditions.

Trap sites were established with bait positioned about 1 m less than the expected distance from the box to net center (11.6 m for the large net and 10.0 m for the small net). Camouflaging snow, brush, and ground litter were carefully placed over the rockets, box, drags, and draglines, so as not to obstruct or interfere with net operation. A rocket landing zone in front of the bait (19–24 m for large net and 14–19 m for small net) was marked with rocks or sticks, visible from the observation position, to reduce the risk of striking the target species (fig. 1). (In addition, an area of 16 by 50 m behind the box should also be considered a no-firing zone, if the area is not obstructed by terrain or vegetation.) The greatest likelihood of success occurred when the net was fired while eagles were feeding head down, facing the box, and/or between the bait and the box.

In 5 shots, 3 single eagles and a group of 4 were caught, for an 80% success rate and an average catch of 1.4 eagles per shot. All were immature birds. The one miss was due to rocket failure. Even with the speed of the rocket net and a bald eagle's large size (2-m wingspan),

some eagles, especially those beyond the bait or perched laterally, were able to fly out from under the deploying net. All birds caught were in front of the bait toward the leading or outer edges of the net; thus, the capture rate might be improved by decreasing the distance from box to bait by 1 to 2 m.

With the winter conditions and eagle numbers that existed during this study, it did not appear possible to capture more than 4 eagles in 1 shot over large ungulate bait, because of the natural spacing of the birds around the carcass. Once caught, the birds remained relatively quiet with minimal entanglement in the net. They were easily removed by two handlers. Bald eagles did not return to the vicinity of a bait station for several weeks, if at all, after the rocket net was fired. The length of such avoidance may vary with winter severity, prey availability, and eagle numbers.

Discussion

Like many kinds of wildlife trapping, rocket netting is as much an art as a science. So many variables affect proper deployment (e.g., charge patterns, rocket placement, launcher elevation and angle, box elevation, drag weight and placement, dragline placement) that any number of configurations may give satisfactory results. About 60% net deployment out of the portable box appears to be maximal for both nets. Thus, the small 2-rocket net has limited coverage and may be ineffective in some situations. Set arrangement and deployment consistency are more critical with the small net, because of the reduced tolerance for variation in deployment. However, the small net system was lighter and quicker to set up than the larger net; and it has the potential of being transported and fired from a smaller box. I found no cost advantage in making rockets and recommend standard WMI rockets for both systems.

The portability of the rocket-net box is perhaps its greatest attribute. The entire system can be carried by two people and set up within 20 minutes. Several bait stations with decoy boxes can be operated simultaneously at various locations and habitats. This greatly improves the trapper's potential for success and increases flexibility in response to varying local conditions. The radio-controlled firing unit also conveys flexibility and efficiency. It eliminates the need for stringing wire from trap site to firing location, and it may be fired from any line-of-sight location, up to 1.5 km away. However, this more sophisticated system can be temperamental, especially when cold temperatures weaken battery and signal strength. Caution must also be exercised to avoid radio signal interference, which could prematurely fire the rockets.

One misfire, related to the remote firing unit, occurred when the system detonated as the arming switch was activated. The internal circuit switch had remained closed after being tested with the minilamp. Apparently after repeated use at the maximum sensitivity setting, insufficient travel distance remained to open the switch. The problem was corrected by decreasing the switch sensitivity (i.e., increasing travel distance) with the remote trim adjustment, and avoided in the future by leaving the minilamp in place for a final check just before connecting the firing line and arming the system. The one rocket failure during trapping may have resulted from a poor connection between rocket-charge leg wires, which could have separated on detonation. The "defective" charge later fired perfectly. Although parallel wiring into the firing line is recommended by WMI and might have eliminated this unusual circumstance, series wiring permits testing the completed circuit through all charges at the firing unit just before arming.

The rocket-net system, improperly or carelessly used, is potentially dangerous, even life-threatening to humans and wildlife. The charged rockets should be handled only enough to make the set and NEVER transported any distance. They should be considered explosives and treated like a loaded, cocked firearm (e.g., the small net rockets with only 26 pellets, when fired without a net, travelled >120 m with a trajectory zenith of >10 m.). Unconfined, the prepackaged charges are much less hazardous; but, they are most safely transported and stored when separated into component parts. Users must also be aware that unexpired rockets continuing to burn on the ground can melt holes in the net or ignite dry ground litter. A suitable fire extinguisher should be kept on hand when operating in dry, grassy areas. New or potential users are encouraged to get firsthand exposure, or at least instruction, from experienced operators. When properly used, the portable rocket-net system can be a safe and effective wildlife capture tool.

Acknowledgments

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Literature Cited

Arnold, K. A.; Coon, D. W. 1972. Modifications of the cannon net for use with cowbird studies. Journal of Wildlife Management. 36(1): 153–155.

Bloom, P. H. 1987. Capturing and handling raptors. In: Giron Pendleton, B. A.; Milsap, B. A.; Cline, K. W.; and Bird, D. M., eds. Raptor management techniques manual. Sci. Tech. Ser. No. 10. Washington, DC: National Wildlife Federation; 99–123.

Dill, H. H. 1969. A field guide to cannon net trapping. Washington, DC: U.S. Department of Interior, Fish & Wildlife Service. 18 p.

Dill, H. H.; Thornsberry, W. H. 1950. A cannon-projected net trap for capturing waterfowl. Journal of Wildlife Management. 14(2): 132–137.

Grieb, J. R.; Sheldon, M. G. 1956. Radio-controlled firing device for the cannon-net trap. Journal of Wildlife Management. 20(2): 203–205.

Grubb, T. G.; Kennedy, C. E. 1982. Bald eagle winter habitat on southwestern National Forests. Res. Rep. RM–237. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station. 13 p.

Hawkins, R. E.; Martoglio, L. D.; Montgomery, G. G. 1968. Cannon-netting deer. Journal of Wildlife Management. 32(1): 191–195.

Lacher, J. R.; Lacher, D. D. 1964. A mobile cannon net trap. Journal of Wildlife Management. 28(3): 595–597.

Marquardt, R. E. 1960. Smokeless powder cannon with lightweight netting for trapping geese. Journal of Wildlife Management. 24(4): 425–427.

Turner, L. B. 1956. Improved technique in goose trapping with cannon-type net traps. Journal of Wildlife Management. 20(2): 201–203.

Appendix 1. Materials needed to construct a standard (3-rocket) rocket-net system.

Assembly item	Quantity
Rocket net box	
Exterior or marine plywood, 1.2 m x 1.2 m x 1.9 cm	1
24 ga. sheet metal, 53.3 cm x 96.5 cm	1
Angle iron, 0.3 cm x 5.1 cm x 2.5 cm	3
2 by 4, 4.5 cm x 8.9 cm x 1.2 m	2
2 by 2, 4.5 cm x 4.5 cm x 1.2 m	1
Metal handles	2
Galvanized finishing nails, 3.8 cm	1 box
Carriage bolts, 5.1 cm x 0.6 cm	3
Carriage bolts, 15.2 cm x 0.6 cm	2
Flathead wood screws, 3.8 cm	18
Roundhead wood screws, 1.3 cm	18
Locking links	6
Spray paint, green and brown primer or white exterior	2 cans
Wood glue	1 bottle
Duct tape	1 roll
Sandpaper, 100 grain	2 sheets
Drag weights (3)	
PVC pipe, schedule 40, 5.1 cm x 30 cm	3
PVC caps, 5.1 cm	6
PVC threaded female connectors with male caps	3
PVC glue, small can	1
Eyebolts with nuts, 0.9 cm x 10.2 cm	3
Large washers	6
Reclaimed lead shot	23 kg
Goldline rope, 0.6 cm diam.	12 m
PVC "T", 5.1 cm	3
10-mm shock cords, 81 cm (if bulk length, 5 m)	12(2)
Firing box and remote-control unit	
Lighted panel switch, 12 v, 20 amps	1
Heavy-duty auto switch, 12 v, 20 amps	1
2-contact terminal board	1
Insulated test clips	2 pkg.
Sub-minilamp, 6 or 12 v, 25 mA	1
Female quick disconnects	2 pkg.
Solderless terminals	1 pkg.
Brass-plated chest handles	2
Brass hinges, 1.9 cm x 1.7 cm	4
Brass hasp	1
Stranded wire, 18 ga.	1 roll
Lamp cord, 16.2 or 18.2	4.5 m
Alligator clips	2
Lantern battery, 12 v	1
Model airplane aileron bellcranks	1
True-threaded rods, 0.1 cm	1
Bolt, 3.8 cm x 0.4 cm	1
Washers, 0.4 cm	2
Nuts, 0.4 cm	5
2-channel radio guidance system (includes transmitters, receivers, and servos)	1
AA batteries	12
Net, rockets, and charges[1]	
27-kg-test knotless nylon net, 5.1-cm-square mesh, treated with Net Coat, 14.1 m x 9.9 m	1
Flip-flop, recoilless net-trap rockets	3
Recoilless rocket charges	3/shot

[1]*Purchased from Wildlife Materials, Inc. R. R. #2, Carbondale, IL 62901.*

Appendix 2. Procedural checklist for operating the rocket-net capture systems.

A. **Firing Unit Test**

1. Extend antenna on remote-control unit and turn unit on.
2. Check servo with remote control; verify on and off operation.
   Adjust trim as necessary for sensitivity and movement of switch.
3. Test circuit with 6- or 12-v minilamp (depending on battery configuration), verify on and off operation.
4. Turn arming switch off, leaving test lamp in place.
5. Turn remote-control unit off.
6. Check arming circuit open (lamp off) with arming switch just before connecting firing line.

B. **Locating Rocket-Net Box, Drags, and Draglines**

1. Measure back from bait to locate rocket-net box (11.6 m for large net and 10 m for small net).
2. Center and level box.
3. Hook shock cords attached to drag weights to anchor lines extending from net.
4. Lay out side anchor lines with weights 1 m behind box and line straight.
5. Place center weight 0.2 m from right side of box, extend anchor line doubled on itself once, parallel and behind to starboard dragline.
6. Make sure all lines are straight and clear, remove any kinks from shock cords.

7. Push handles flush against box.

C. **Preparing Rockets and Firing Circuit**

1. Put on eye and ear protection.
2. Unscrew rocket back.
3. Attach rockets to net leads with locking links (green right, blue center, red left).
4. Hook rockets over front of channels (cap or weld of attachment eye usually provides sufficient lip to prevent rockets from slipping to rear of channel.)
5. Prepare charges. *Keep wires shunted as much as possible.*
6. Shake primer down amongst pellets.
7. Place charges in rockets, screw backs on.
8. *Check for and avoid power lines, radio towers, static electricity* (avoid wearing nylon).
9. *Keep back turned and stay clear of rockets when possible.*
10. Connect leg wires, each wire from center rocket to 1 of outer rockets.
11. Connect the outer wires to firing line.
12. Bend or prop connections up in the air to insure they will not short across ground or debris. This is especially important when camouflaging snow, litter, etc., is used.
13. Recheck everything before leaving box set.
14. Extend firing line laterally to maximum distance.
15. Check circuit continuity with blasting galvanometer.

D. **Connecting Firing Line**

1. Verify arming switch is off.
2. Verify remote-control unit is off.
3. Extend wire antenna from firing unit so that it will be in view from the observation point. If possible thread antenna up through bush or prop up with stick.
4. Visually check entire set, all but firing person move away.
5. Turn back to rockets.
6. Connect firing line.
7. Arm the firing unit and carefully move to observation point staying well clear of the armed set.

E. **Firing**

1. Turn on remote-control unit.
2. Verify rocket-landing and rocket-blast zones are clear.
3. Visually check the vicinity of the rocket net is clear.
4. If a test shot, loudly yell "Fire in the hole!" in advance of firing.
5. Fire, by throwing the switch on the remote-control unit.

F. **After Shot**

1. Lower antenna on remote-control unit.
2. Turn off remote-control unit.
3. Turn off arming switch and servo on firing unit.
4. Remove captured animal(s) from net and process before continuing.
5. Disconnect firing line, and test for continuity (to insure no breaks occurred during firing).
6. Disconnect rockets from net, close locking links, and return to box.
7. Disconnect center drag and close locking link, unhook side drag weights, and return to box.
8. Stretch and fold net.
9. Lubricate all threads on locking links and rockets before reuse or storage.

G. **Folding the Net**

1. Stretch net fully; dry before folding.
2. Remove any visible debris.
3. Unravel twists in lead lines as much as possible.
4. At front and rear, grasp net midway between center and one side and pull to center.
5. Gather net under center section.
6. Grasp outer edge of same side and pull to center.
7. Gather remaining net under lateral edge line.
8. Repeat steps 4–7 for other side.
9. Make sure both lateral edge lines lie side by side on top of gathered net.
10. Keep left, center, and right leads properly oriented and separated.
11. Clean any debris from box and stand it on end, bottom facing net.
12. Lay rear of net in box.
13. Make sure draglines go all the way to bottom of upright box. Following 3 corners out, feed left line out what will be lower left corner when box is properly positioned, right line out lower right and center line out upper right.
14. Layer or coil net into box with lateral lines on top as much as possible.
15. When net is almost in box, make sure 3 leads are properly oriented and separated.
16. Coil in leads separately, sides first, center last.

(For folding small net, fold edges to center and gather net underneath; the remaining steps are similar.)